

Remarks

Claims 1-49 were originally filed in this case. In response to a Restriction Requirement mailed August 8, 2000, Applicants elected to prosecute Group I comprising claims 1-34. Claims 1-49 have been deleted and replaced with new claims 50-82.

In an Office Action dated November 6, 2000, the Examiner rejected claims 1-22 and 25 under 35 U.S.C. § 112, second paragraph. The Examiner rejected claims 1-4, 5-16, 18-30 and 33-34 under 35 U.S.C. § 102(b) as being anticipated by European Patent Application No. EP 0 727 772 by Gray *et al.* (Gray). The Examiner rejected claims 5-7, 17 and 31-32 under 35 U.S.C. § 103(a) as being unpatentable over Gray in view of U.S. Patent No. 5,274,521 to Miyauchi *et al.* (Miyauchi). Applicants respectfully disagree with the Examiner's rejections. Applicants have replaced claims 1-34 with new claims 50-82 solely to more particularly point out Applicants' invention.

The 35 U.S.C. § 112 Rejections

The Examiner rejected claims 1-22 and 25 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim Applicants' subject matter. According to M.P.E.P. § 2173.02, Applicants have latitude in their choice of language.

Definiteness of claim language must be analyzed, not in a vacuum, but in light of:

- (A) The content of the particular application disclosure;
- (B) The teachings of the prior art; and
- (C) The claim interpretation that would be given by one possessing the ordinary level of skill in the pertinent art at the time the invention was made.

The Examiner rejected claims 1 and 14 stating that "the phrase 'yokes . . . on either side of the position line' is misdescriptive since the part of the yokes are on each side of the position line." (¶ 3, pg. 2.) This precise language is used in describing Applicants' Figure 1 at page 6, lines 17-21 as follows:

Yokes 30 are alternately positioned to lie on either side of position line 40. By alternating the orientation direction of yokes 30, write elements 22 may be more closely spaced on tape head 20, permitting an increased number of data tracks 24 for a given width across magnetic tape 26.

It is clear from the specification what Applicants mean by the phrase “on either side of the position line.”

The Examiner rejected claim 25 stating that “the phrase ‘each loop . . . encircles the yoke upper section is indefinite since it is unclear where the upper yoke is encircled, rendering the claim misdescriptive.” (¶3, pg. 2.) This language is used in describing Applicants’ Figure 1 on page 6 at lines 9-13 as follows:

Yoke back region 34 admits conductive coil 38. The plane of each loop of conductive coil 38 is generally normal to tape 26. Loops of conductive coil 38 may encircle the upper section of yoke 30 as shown or, preferably, may encircle the lower portion of yoke 30 as described with regards to Figures 2 through 10 below.

It is clear from the specification what Applicants mean by the phrase “encircles the yoke upper section.”

The Examiner rejected claim 9 stating that “the phrase ‘position line forms an acute angle with the media direction’ is misdescriptive since the line is normal to the media direction. Claim 9 depended from claim 1, which placed no restriction on the relation between the position line and the media direction. Further, angling the position line relative to the media direction is disclosed in the specification at page 7, lines 4-7 as follows:

Also, the angle between position line 40 and tape direction 28 may take on a wide range of values to accommodate various two dimensional geometric configurations and placements for write elements 22.

Thus, there is no reason why the position line must be normal to the direction of media travel.

The 35 U.S.C. § 102 Rejections

The Examiner rejected claims 1-4, 5-16, 18-30 and 33-34 under 35 U.S.C. § 102(b) as being anticipated by Gray. A claim is anticipated only if each element appears in the cited art. The entirety of the Examiner’s explanation, from ¶4, page 3, is provided as follows:

The aforementioned claims set forth the following feature, inter alia, disclosed in Gray et al ‘772: a magnetic recording head having a plurality of thin film elements, each element having a yoke with front and back regions alternately positioned on each side of a position line, each yoke formed on a substrate; a position line normal to the media direction; each gap of the thin film elements having a gap angle with the position line and

opposite the gap angle of the adjacent gap angle; a conductive coil having a plurality of loops, each loop having a portion passing within the yoke and encircling the lower yoke section; see Figures 2, 5 and 7 of Gray et al '772.

Gray's Figure 2, illustrating prior art, shows two elements with planar coils situated on a common substrate. The elements are situated across from each another. Gray describes the problem with this design at column 2, lines 18-25 as follows:

Unfortunately, thin film heads which employ planar spiral coil structures, such as coils 60 and 65 shown in FIG. 2, consume a relatively large amount of substrate area. This is especially true when multiple heads and multiple coil structures are situated on a common die 70 as illustrated. It is difficult to sufficiently miniaturize this planar spiral type of head assembly to fit within reduced size windows and slot in the head assembly.

Gray's solution is to construct a write element with the gap located above helical coils, as described at column 2, line 51 through column 3, line 3, reproduced in part as follows:

The thin film head also includes a substantially helical thin film coil structure situated atop the substrate, . . . An elevated thin film magnetic gap structure is situated atop the coil structure.

This is the structure pictured in Figures 5 and 7.

Since Gray's write element has a gap located above the conductive coils, it is not possible for Gray's elements to be alternately positioned on either side of a position line as provided in claim 1. Also, it is not possible for Gray's elements to have a yoke with a front region forming a gap and a back region admitting a conductive coil, with the yoke front regions substantially aligned across a position line and the yoke back regions lying alternately on either side of the position line as provided in claim 7. Further, it is not possible for Gray's elements to have a yoke upper section having a back region and a front region extending from the back region with the yoke upper section front region defining a gap as provided in claim 23. Since all other claims depend from either claim 1, 7 or 23, Gray cannot anticipate any of Applicants' claims.

The 35 U.S.C. § 103 Rejections

The Examiner rejected claims 5-7, 17 and 31-32 under 35 U.S.C. § 103(a) as being unpatentable over Gray in view of Miyauchi. The Examiner relies on Miyauchi to show "a flux sensing read element being located between the yokes of the head" and to show "a

magnetic head having a read element (36) which is within the yoke (53) beneath the gap." (¶6, pg. 5.)

As seen in Figure 1, Miyauchi discloses an element having gap g centrally located in upper yoke 37 between yoke halves 37A and 37B. (*See*, col. 5, ll. 19-24.) Thus, no combination of Gray and Miyauchi teach Applicants' inventive arrangement of elements.

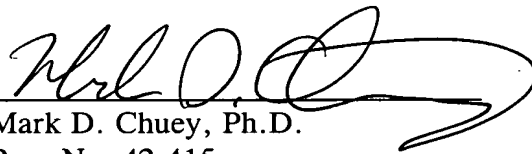
Conclusion

Applicants believe that new claims 50-82 meet the substantive requirements for patentability. The case is in appropriate condition for allowance. Accordingly, such action is respectfully requested. Fees in addition to those provided with this amendment may be charged to Deposit Account 19-4545 as specified in the Application Transmittal.

The Examiner is invited to telephone the undersigned to discuss any aspect of this case.

Respectfully submitted,

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Attachment

**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

1 50. (New) A magnetic recording head for writing multiple data tracks onto a
2 magnetic media traveling across the head in a media direction, the head comprising a plurality
3 of thin film write elements, each element having a front region defining a gap and a back
4 region admitting a conductive coil, each gap substantially aligned along a position line, the
5 yokes alternately positioned such that a first plurality of write elements has each back region
6 on a first side of the position line and a second plurality of write elements has each back region
7 on a second side of the position line opposite the first side.

1 51. (New) A magnetic recording head as in claim 50 wherein the write
2 elements are formed on a common substrate.

1 52. (New) A magnetic recording head as in claim 50 wherein each write
2 element is operative to inductively sense field patterns written onto a data track.

1 53. (New) A magnetic recording head as in claim 50 wherein each write
2 element contains a read element within the yoke beneath the gap.

1 54. (New) A magnetic recording head as in claim 53 wherein each yoke
2 comprises an upper section and a lower section separated in a portion of the yoke under the gap
3 by an insulating layer containing the read element.

1 55. (New) A magnetic recording head as in claim 53 wherein the read element
2 is a flux sensing read element.

1 56. (New) A magnetic recording head as in claim 50 wherein the position line
2 is normal to the media direction.

1 57. (New) A magnetic recording head as in claim 50 wherein the position line
2 forms an acute angle with the media direction.

1 58. (New) A magnetic recording head as in claim 50 wherein each gap has a
2 gap angle with the position line, each write element gap angle opposite in sign from the gap
3 angle of the gap on an adjacent write element.

1 59. (New) A magnetic recording head as in claim 50 wherein the magnetic
2 media is magnetic tape.

1 60. (New) A magnetic recording head as in claim 50 further comprising at
2 least one additional plurality of write elements, each additional plurality of write elements
3 having an associated position line, each write element in the at least one additional plurality
4 of write elements having a gap substantially aligned along the associated position line.

1 61. (New) A magnetic recording head as in claim 60 wherein each write
2 element gap has a gap angle with the associated position line, each gap operative to write a data
3 track on the magnetic media, each write element gap angle opposite in sign from the gap angle
4 of a gap operative to write an adjacent data track.

1 62. (New) A magnetic recording head for writing multiple tracks onto
2 magnetic media traveling across the recording head, the recording head comprising a plurality
3 of thin film write elements, each write element comprising a yoke having a back region and
4 a front region extending from the back region when viewed in a plane parallel to the magnetic
5 media, the front region forming a gap and the back region admitting a conductive coil, wherein
6 a position line extends across the plane and intersects the projection of each track onto the
7 plane and wherein the write elements are arranged with the yoke front regions substantially
8 aligned across the position line and the yoke back regions in a first plurality of write elements
9 lying on a first side of the position line and a second plurality of write elements lying on a
10 second side of the position line opposite of the first side.

1 63. (New) A magnetic recording head as in claim 62 wherein each gap is a thin
2 opening across the yoke front region in the plane, the thin opening defining an associated gap

3 axis through the longest portion of the gap, each gap formed at a gap angle between the
4 position line and the associated gap axis, wherein the gap angle magnitude is the same for each
5 write element and the gap angle sign is opposite between adjacent write elements.

1 64. (New) A magnetic recording head as in claim 62 wherein each write
2 element is operative to inductively sense field patterns written onto a track on the magnetic
3 media.

1 65. (New) A magnetic recording head as in claim 62 wherein each write
2 element further comprises a read element located within the yoke front region beneath the gap.

1 66. (New) A magnetic recording head as in claim 62 wherein the yoke width
2 tapers gradually from the back region to the front region narrower than the back region.

1 67. (New) A magnetic recording head as in claim 62 further comprising at
2 least one additional plurality of write elements, each additional plurality of write elements
3 having an associated position line, each write element in the at least one additional plurality
4 of write elements having a gap substantially aligned along the associated position line.

1 68. (New) A magnetic recording head as in claim 67 wherein each gap is a thin
2 opening across the yoke front region in the plane, the thin opening defining an associated gap
3 axis through the longest portion of the gap, each gap formed at a gap angle between the
4 position line and the associated gap axis, wherein the gap angle magnitude is the same for each
5 write element and the gap angle sign is opposite between write elements operative to write
6 adjacent data tracks.

1 69. (New) A magnetic recording head as in claim 62 wherein the position line
2 is normal to the direction the magnetic media travels across the recording head.

1 70. (New) A magnetic recording head as in claim 62 wherein the position line
2 is at an acute angle with the direction magnetic media travels across the recording head.

1 71. (New) A magnetic recording head for writing multiple data tracks onto
2 magnetic media traveling in a media direction over the head, the head including a plurality of
3 write elements, each write element comprising:

4 a substrate parallel to the magnetic media as the magnetic media travels by the
5 head;

6 a first magnetic layer deposited on a portion of the substrate, the first magnetic
7 layer forming a lower section of a yoke;

8 an insulating layer deposited over a center portion of the yoke lower section;

9 a second magnetic layer deposited over the insulating layer and the portions of
10 the yoke lower section not covered by the insulating layer, the second magnetic layer forming
11 an upper section of the yoke, the yoke upper section having a back region and a front region
12 extending from the back region, the yoke upper section front region defining a gap; and

13 a conductive coil comprising a plurality of loops, each loop having a portion
14 passing within the yoke such that at least a portion of each loop is normal to the substrate;

15 whereby current passing through the conductive coil induces magnetic flux in
16 the yoke, the magnetic flux writing one of the multiple tracks on the magnetic media as the
17 magnetic media passes by the gap.

1 72. (New) A magnetic recording head as in claim 71 wherein each loop of the
2 conductive coil encircles the yoke lower section such that at least one portion of each loop
3 passes below the yoke lower section.

1 73. (New) A magnetic recording head as in claim 71 wherein each loop of the
2 conductive coil encircles the yoke upper section such that at least one portion of each loop
3 passes above the yoke upper section.

1 74. (New) A magnetic recording head as in claim 71, each write element
2 having an orientation direction defined by a line from the yoke back region to the yoke front
3 region, wherein each write element has at least one neighboring write element having the
4 opposite orientation direction.

1 75. (New) A magnetic recording head as in claim 74 wherein the front region
2 of each write element yoke upper section is adjacent to the yoke upper section front region of
3 the at least one neighboring write element.

1 76. (New) A magnetic recording head as in claim 75, the gap comprising a thin
2 slit across the yoke upper section front region at a gap angle relative to the written data track,
3 wherein the gap angle of each write element is different than the gap angle of the at least one
4 neighboring write element.

1 77. (New) A magnetic recording head as in claim 71 wherein each write
2 element is operative to inductively sense field patterns written onto a magnetic media data
3 track.

1 78. (New) A magnetic recording head as in claim 71 wherein the yoke upper
2 section front region is located a greater distance from the substrate than the yoke upper section
3 back region.

1 79. (New) A magnetic recording head as in claim 78 further comprising a read
2 element located in the insulating layer beneath the gap in the yoke upper section front region.

1 80. (New) A magnetic recording head as in claim 79 wherein the read element
2 is a magnetoresistive read element.

1 81. (New) A magnetic recording head as in claim 71 wherein the yoke upper
2 section back region gradually tapers to the width of the narrower yoke upper section front
3 region.

1 82. (New) A magnetic recording head as in claim 71 wherein the magnetic
2 media is magnetic tape.